AN EVOLVING COLLABORATION : PERFORMER AND COMPOSER APPROACHES TO CREATING VISUAL MUSIC

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ABSTRACT

This article aims to identify the key factors that contributed to an evolving collaborative practice between a performer (Canham) and a composer (Lopez Charles). Three new works for clarinet, electronics and video, presented as case studies, form the basis of this study. Journals, artifacts including sound recordings of experiments, rehearsals, performance documentation and joint reflection will allow the researchers to describe and reflect upon the evolution of their collaborative practice as it unfolded.

Nicole Canham, clarinetist, is a PhD candidate at Queensland University (Australia), researcher in residence at the Maison des Sciences de l'Homme, Paris Nord, working in the area of qualitative research methods applied to understanding aspects of musical practice. Carlos Lopez is a PhD candidate at Paris VIII University, composer and musicologist who specialises in composition with new technologies.

1. INTRODUCTION

Dannenberg suggests that the use of computers in music composition "leads to new ways of thinking about music composition and performance" [5]. In this project, two participant/researchers set out to document and observe their own collaborative process in the context of the development of a new work for clarinet, electronics and video which was based around interactive components facilitated by the use of computer technology. The aim was to track and identify key factors – including new ways of thinking – that emerged during the process of creating three visual music works.

2. THE STUDY OF COLLABORATION

Collaboration has been a subject of study in numerous fields including business [14], the arts and sciences, [13] in improvisational contexts in music and theatre [18] and in the field of performer/composer collaboration [see for example 6, 7, 11 and 12]. Performer/composer studies have addressed issues of the nature of collaboration – which are often framed in terms of 'process' – and the outcomes of the collaborative work environment – which Hayden refers to as 'output' [11]. Analysis and observations about collaboration, subsequently, can be made from a variety of angles which include detailed descriptions of processes involved [13], or a focus on the employment of a collaborative approach with a certain outcome or output in mind.

John-Steiner suggests that "construction of knowledge is embedded in the cultural and historical milieu in which it arises [13]". Her view provides an interesting challenge in the study of performer/composer collaborations in so far as these roles have often been perceived to be quite separate. In the western art music tradition, it has been argued that this segregation of roles is a product of the view of the score-as-object, an idea attributed to German music critic E.T.A Hoffman [8]. Hoffman's notion of 'Werktreue', first proposed in the early 1800s, introduced a concept of musical works in which all other aspects of the presentation should be subservient to the score: "musical activities, be they of composition, performance, reception, evaluation, or analysis, should no longer be guided by extra-musical considerations of a religious, social, or scientific sort. They should now be guided by the works themselves [8]".

The nineteenth century view of composition and performance has endured in two key ways. Both the direction and evolution of practice have been influenced. One of ways in which this influence can be perceived is in the limits the *werktreue* concept has placed on the musicological discourse [8]. A preoccupation with the score has shaped the scope and focus of scholarship, with many other aspects of the compositional and music making process being overlooked. This has included a narrow view of the role the performer [19] and, until recently, limited contribution from performers in academic research [4]. A second consequence of a score-based approach has been the evolution of practice to reflect this emphasis, one example of which is the lengthy period in which improvisation for classically trained performers was not in vogue [19].

In recent years, however, many of the limitations of a nineteenth century view of composition and performance have been addressed or challenged [2, 8, 9, 19, 22]. One advantage of the new directions in thinking and practice

proposed has been the examination of a range of creative and artistic roles and relationships. Increasing research based upon a reconsideration of the work of the composer, the view of the performer and the opportunities offered by the addition of computer technology in the composition and performance workspace provide examples of a shifting dialogue.

3. CHALLENGING TRADITIONAL ROLES

A common theme in recent research into the activities of composers and performers has been the unmasking of processes that were not previously viewed as central to a discussion about creating new works. Studies of collaboration have been one area of scholarship in which more nuanced pictures of performer and composer have been proposed. These studies also often reflect consideration of other elements influencing collaborative environments, including the use of digital technology.

With regard to composers, Hayden and Windsor [11] highlight the inaccuracy of the commonly held view of the composer as a lone genius when examined in the context of the creation of new works. Rather, they suggest that composers have always had some degree of interaction with performers, conductors or publishers, but that this has often been neglected in the discourse.

Performers, according to Crispin, [4] negotiate a reality in which many aspects of their practice are deliberately kept half-concealed: the years of training and discipline required in order to develop the connection between performer and instrument is often hidden in the desire to make performances appear effortless. Crispin suggests this reveals a preoccupation with the ideal at the expense of developing a "deep understanding of live performance in all its guises [4]".

Digital technology has also been recognized as a key compositional and collaborative tool in the twenty first century. Dannenberg, commenting on the rapid growth in capabilities of digital technology and the opportunity these present in creative contexts, suggests that "the biggest challenges ahead are artistic rather than technological. One of the attractions of this pursuit is that there are relatively few precedents and no established theory [5]".

In the absence of a single established theory, a range of ideas have been proposed in understanding the role of digital technology in artistic collaborations. Within the domain of music making, some studies have focused on the way technology has been used as an instrument for artistic practice – Partti's study of the 'digital musician' is one example [16]. Digital technology has also been harnessed to facilitate the sharing of information among musicians through web-based communities of practice. [17] Literature concerning the design of computer-supported co-operative work systems (CSCW) addresses the influence of social factors on systems design. [3] One aspect of CSCW which is pertinent to this study is the notion of tailorability. [21] Although Dannenberg [5] emphasizes that creating visual music using technology is essentially an artistic challenge, questions of tailorability - how system design decisions are to be made, and who is to make them - remain an issue. These three elements of performer, composer and digital technology are focal points of this investigation of aspects of collaboration.

4. RESEARCH AIMS

4.1. Research questions

The study was built around a central question: What were the key factors that shaped this collaboration?

These factors included observation and consideration of the facilitators and constraints inherent in the study, which included:

- Practical and creative matters, including issues of systems design;
- The nature of the working process, identification of patterns of decision making, evaluation and discussion; and,
- Discussion of the similarities and differences between performer and composer objectives as the collaboration progressed.

In acknowledging that the project united artists with different backgrounds and approaches, there were a series of sub-questions for both researchers which related directly to their own questions about their role in a collaborative work environment.

4.2. Composer-related questions:

How can different compositional approaches open up space for contrasting ways of collaborating with a performer? How can these approaches influence the relationships between sound and image in the creation of visual music?

4.3. Performer-related questions:

What makes a performer of an acoustic instrument necessary in the electroacoustic and visual framework?

To what degree can a performer make connections between visual and musical elements if they have no visual score or cannot watch the video during the performance?

To what degree does or should the performer have a role in the creative (compositional) process?

5. APPROACH

In this study, the authors and co-participants brought different areas of expertise to the research. Nicole Canham has commissioned numerous new works in her professional career as a performer, and has collaborated with a wide range of artists in diverse settings. Canham's doctoral research draws upon qualitative research methods, in particular that of case study. Carlos Lopez Charles is a composer whose work has focused mainly on electro-acoustic composition and computer programming. His current Phd study in the area of visual music is concerned with the compositional techniques in this field. The study presents three different examples of composer-performer collaboration which took place over a two-year period. During this time three new works for clarinet, video and electro-acoustic music were created. The creation of each work, presented as a case study, reflects approaches to collaboration shaped by a variety of factors including the participants' varied expertise. The aim of presenting two cases of earlier collaborative works prior to the current project is two-fold: as a form of triangulation, and to provide a framework for evaluating to what degree the collaborative process evolved between our first and our most recent attempt.

Willis [23] suggests that what we believe to be the "nature of truth (ontology) and what it means to know (epistemology)" (p.10) forms the basis of the ways in which research can be conducted and understood. Given the research aims, which are focused on gaining a greater understanding of multiple perspectives of the same situation, the ontological position of this study is that there are multiple versions of reality rather than a single truth, locating this study within the constructivist paradigm [1, 10, 24]. Reality, then, is constructed through the accounts and reflections of the researchers who were co-participants in the project [10, 23, 24]. The research design reflects a close connection between the authors' researcher roles and their roles as participants as they worked together to co-construct an account of their evolving collaborative process.

5.1. Methodology and Methods

Collaboration has been studied using a range of qualitative research methods, which have included interview [13], observation [12], video interaction analysis [18] and reflective journal [11]. Case study is a research methodology that is often used in research based upon a constructivist paradigm, and has also been applied in studies of collaboration [10, 11]. One of the advantages of case study is that it enables the researcher to employ a variety of different methods in the gathering of data [25], which includes those methods stated above and other artifacts. In the case of this study, artifacts included meeting notes, task-based activities, scores with annotations, email correspondence, and recordings of rehearsals and performances.

5.2. Case Study

There are several different types of case study that researchers utilize, which Stake describes as intrinsic, instrumental and collective [20]. Willis [25] offers two further sub-categories which are perhaps more reflective of the ways in which the data is expected to be used: "descriptive case study [25]" is concerned with detailed descriptions of cases. "Interpretive case study" takes the descriptive case study work further, aiming to use the data generated to make statements about contexts beyond those being documented and described. "The focus is on understanding the intricacies of a particular situation, setting, organizations, culture, or individual, but that local understanding may be related to prevailing theories or models [24]".

Instrumental case study, like Interpretive case study, enables the researcher to develop detailed accounts of individual cases, but the purpose of the study is to use the case to provide insight about an issue.

This instrumental case study describes the creation of three new works in order to understand the nature of each collaborative context on an individual basis. These cases will then be considered together with a view to developing insights about the outcomes of an evolving collaborative process. Three examples of the creation of different works are used to illustrate ways in which creative and technical approaches to visual music from composer and performer perspectives evolved.

6. CASE STUDY 1 – *NOT ALONE*, FOR CLARINET, LIVE ELECTRONICS AND VIDEO

Nicole: Reading back over our emails at the time *Not Alone* was being written, I notice that the conversation had a lot to do with practical concerns. I liked the piece a great deal on first hearing and nothing in the score was technically problematic, so my feedback focused on page turns, breathing and some articulation issues. *Not Alone* was my first foray into working with live electronics in a surround sound environment. Perhaps as a result of this, the score Carlos provided me was highly detailed to ensure that the clarinet input would make the delay effect respond as envisaged.

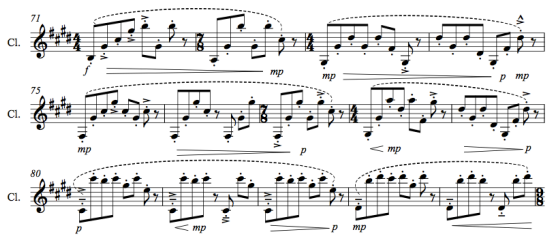

Figure 1. Score excerpt, *Not Alone*

The video that accompanied *Not Alone* was created by a colleague after the music had been composed, almost as a creative response to the music.

In a way, it seems as though we were trying to superimpose different ways of working over the top of each other. I commissioned *Not Alone* as part of a multimedia installation/performance piece which involved a larger team of Australian and Mexican artists. *Not Alone* was a collaboration-within-a-collaboration in that sense, as I was also developing a cohesive 60-minute long program. I wrote to Carlos about this on 4 May, 2011, about three weeks before the premiere:

> "I included a quote about time for each piece that inspires me on the musical interpretation side of things. In terms of the order, I've suggested it considering three different perspectives:
> 1. Ease of change of instruments, because I'm changing as we go;
> 2. Key [tonality] relationships between pieces so there isn't a jarring sensation going from one piece into the next;
> 3. Narrative possibilities of music in that order."

Conceptually, bringing in the time quotes as my own interpretive aid had to do with the 'time' theme of the larger program. It was, however, quite different from the musical frame of reference that Carlos had first discussed with me. He was interested in delay effects used by electric guitarists in the 1980s, and was keen to find a way to transfer this idea into a piece for clarinet. Carlos was also left to consider all the technical matters that I didn't understand, or perhaps hadn't thought through coming from a background of mostly acoustic performance. Carlos' system design had a reactive function to performer and composer input: my sound was processed with a delay feedback effect and Carlos varied the volume and the spatialisation of the delayed clarinet sounds. In performance, I felt as though my playing and his live diffusion of the sound were similar to making chamber music, although I never experienced the full perspective of the spatialised performance.

7. CASE STUDY 2 – *LAS FLORES Y LAS NUBES*, FOR CLARINET, ELECTRONICS AND VIDEO

Carlos: My goal for this piece was to have a higher degree of integration between video and music than in *Not Alone*. Early discussions with Nicole focused on the technical aspects of how I wanted to approach this challenge. I also made a point of working with Nicole using improvisation as a basis for testing and developing ideas. We had two improvisation/recording sessions before a period of time apart.

Figure 2. Still image from *Las flores y las nubes*

Although I intended to take a less conventional approach with this piece, I still made most of the compositional decisions on my own. I composed the video first and then the electroacoustic tape part, trying to make an audiovisual piece that could stand on its own and over which I could then add a clarinet part. To make the video, I used a custom-made program that allowed me to vary the size, movement and color of up to 12,000 points. Using this idea as a model for the composition of the tape, I created a patch to control different variables of a flow of short (15 ms. to 200 ms.) electronic sounds produced by a very sophisticated FM-based synthesizer.

At this stage, I was consciously avoiding the incorporation of clarinet sounds into the tape because I felt that approach (which is quite common) to be too standard. The Max/MSP patch that I made for the clarinet was programmed so that it changed its variables automatically at specific moments of the piece which meant that synchronization of parts was critical. For this reason, I included a click track that would enable the performer to synchronize with everything else very precisely. We didn't see each other after our improvisation sessions until 3 weeks before the premiere of the piece, so the clarinet part was completed by me and then discussed and revised in our final rehearsal period. I sent a very detailed score, along with a patch, a video and a click track to Nicole six weeks prior to our planned rehearsals. As it turned out, none of the work from our improvisation sessions was included in the finished score.

In our first rehearsal, I realized that the clarinet's sound did not blend as well as I wanted with the electronic sounds that I had chosen. I decided to integrate some transformed clarinet sounds into the tape part that would allow for a tighter connection between tape and clarinet. Adding these sounds, using a reverb effect and making minor changes to the score helped to achieve a higher degree of integration between the clarinet and the electronic part. We eventually used improvisation for the ending of the piece.

Nicole: *Las Flores*, like *Not Alone*, was premiered within a larger multimedia performance. The context of the premiere also reflected some of the broader technical

and programming challenges that we were negotiating. This included practicalities of how the video was to be projected, the projection surface (black), the style of projection (via Matrox) resulting in a wrap-around style image, and the low level of light necessary in order to have the videos look most vibrant.

The technical and programming concerns surrounding the performance as a whole also impacted staging options. Although I performed almost the whole program from memory, I had to perform *Las Flores* with music in a fixed space so that I could access the click track to ensure that my part and the electronic part were together in performance. In order to accommodate the video requirements of the piece, I was obscured from view by some large pieces of black foil blocking the light coming from the sconce on my music stand. Transitions from one piece to the next were also critical in this performance. Carlos had left the ending of *Las Flores* quite open which gave us the opportunity to weave together a number of elements. This included some improvisation in performance on my part for the ending of the piece, which also incorporated mechanical instruments made by an artist-colleague. Whilst I felt sonically embedded in this piece, I didn't visually feel a part of it and it was difficult for me to be seen by the audience.

8. CASE STUDY 3 – *POINTS, LINES, PLANE*, FOR CLARINET, LIVE ELECTRONICS AND LIVE VIDEO

Nicole & Carlos: We had originally planned to re-work *Las Flores*, and so we set aside some time for discussion and experimentation. This included individual and joint reflection on what we felt worked well, and what might be improved based upon our experiences of both *Not Alone* and *Las Flores*. Feedback from Carlos concerned finding a better blend with clarinet and tape. Feedback from Nicole was concerned with having a better visual connection between performer and video, and exploring more meaningful ways of connecting with the visual element as a performer. Feeling able to make connections between the performative aspect of the visual component and other visual elements, namely the performer as visual component, was impeded by the necessity of performance with score and click track. We were also keen to set some new challenges and parameters for this collaboration. We wanted all the elements to be able to interact, as a basis for creating a collaborative environment where we would challenge our traditional roles as performer and composer. The goal was to develop a working process which might enable us to foster a collaborative environment where roles felt equal and to some degree interchangeable.

Nicole: One of our conversations stands out to me – I had been discussing with Carlos some of the problems I find with using a click track and he suggested, "what if we get rid of the click track?" We then moved on to considering how we might structure the score and this led to the thought… "what if we get rid of the score?" These two questions for me, and the possibilities opened up by leaving both click track and score behind, were the beginning of a completely different approach, and a new piece.

Carlos: Reflecting on my discussions with Nicole led me to realize that the issues that we were trying to address (in particular those of *music-video* and *performer-video*) could be solved by establishing interactions between electronic sounds, instrumental sounds and moving images through the use of the computer. Inspired by Josh Nimoy's "Bouncing Balls", I created an interactive system based on the idea of balls that make electronic sounds each time they bounce against lines drawn by the user. I programmed a patch in Processing to control the moving images and used Serge Le Mouton's *samplor~* object in Max/MSP to play the audio samples each time a ball bounced. When bouncing against a line, the horizontal coordinate of a ball is mapped to a sound's position in a two-channel (left right) stereo field, while its vertical coordinate is mapped to its pitch (high to low). The communication between Max and Processing was established through the use of OSC messages.

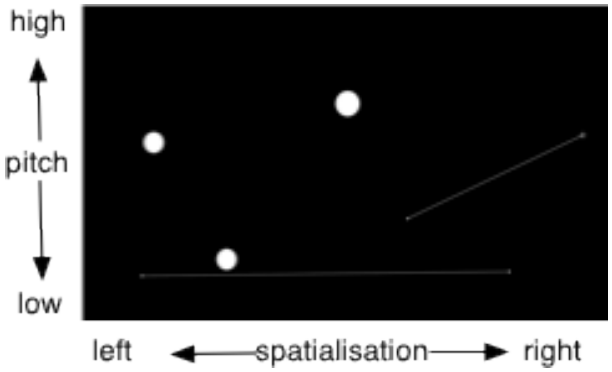

Figure 3. Mapping of the balls' coordinates when colliding with a line

In a way, this system was already offering an answer to the sound-image integration in the piece, but the relationship between the performer and the visuals still had to be addressed. In order to do this, I used Miller Puckette's *bonk~* Max/MSP object to detect the clarinet's percussive attacks and Tristan Jehan's *analyzer~* object to track its loudness.

Nicole: Our first session working with Carlos' new system gave me a lot of ideas in terms of how the clarinet and the video might relate in an interactive setting, particularly with the use of my instrument as controller. Visually, I was very taken with being able to trigger pitched, bouncing balls with my clarinet sounds. A secondary task, and one that came out of these sessions, was then to consider how I might sonically relate to the sound being produced by the balls once I

had triggered them. This included my own 'homework', which was to develop techniques that in some ways mimic or approach the sound that the balls produce.

Carlos: A challenge of the instrument-as-controller approach is that it seemed to me to have some compositional and technical limitations. Incorporating a physical interface with different multi-slider controllers that would also let *me* manipulate the behavior of the balls in a more flexible way seemed to be a good solution. Using the multi-slider allowed me to improvise with Nicole and create a wider range of musical ideas than if I just let the system react to her input. It also gave me the possibility of an interpretive role in the piece, not only a compositional one.

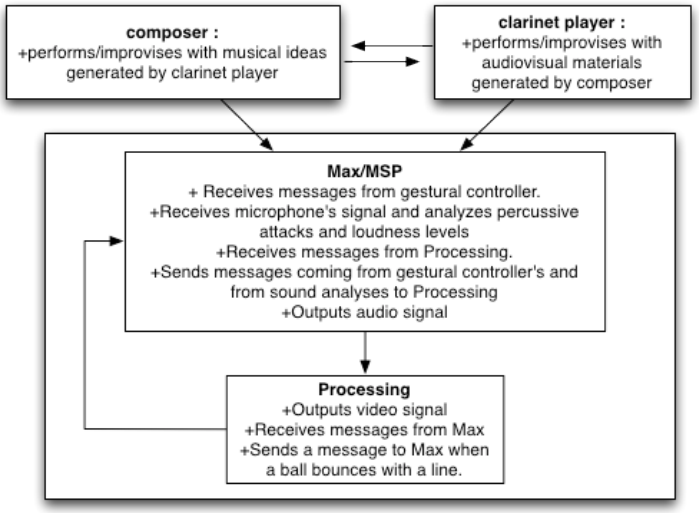

Figure 4. System design for the performance of *Points, lines, motion*

9. ANALYSIS

Our framework for analysis of these descriptive accounts draws upon the work of John-Steiner, Weber and Minnis in two ways [14]. Firstly, we draw upon their definition of collaboration:

> The principals in a true collaboration represent complementary domains of expertise. As collaborators, they not only plan, decide, and act jointly, they also *think together,* combining independent conceptual schemes to create original frameworks. Also, in a true collaboration, there is a commitment to shared resources, power, and talent: no individual's point of view dominates, authority for decisions and actions resides in the group, and work products reflect a blending of all participants' contributions [14].

We also adopt John-Steiner, Weber and Minnis' approach of "looking for commonalities and differences across settings, tasks, working methods, goals, and values" [14] as a tool in understanding and interpreting our collaborative process.

10. DISCUSSION

In reflecting upon the ways in which changes to our collaborative approach facilitated or constrained the development of an equal, interactive, creative working process we identified some key influential factors. These resonate throughout the Case Study descriptions offered here. We were able to observe similarities and differences from case to case in three main areas:

1. Challenging traditional roles
2. Changes to practice
3. Reflection: individual reflection and joint discussion

10.1. Challenging traditional roles

Changes of approach to our roles within the collaborative environment highlight advantages and problems with the notion of true collaboration as outlined by John-Steiner, Weber and Minnis. Case Study 1 provided an example of a fairly standard commissioning arrangement. Within that framework, roles of composer and performer were essentially quite separate and the collaborative aspect of the work is best described as a 'layering' of these elements to produce the finished piece. Advantages of this approach within the context of *Not Alone* included differing concerns and levels of expertise that needed to be taken into account for both practical and artistic reasons. The performer, for example, was more than happy to defer to the views of the composer in relation to the presentation of the score and the live electronics environment because that was a new area in which she had limited experience. This was also the first time the artists had worked together. Limitations of this approach impacted the artistic outcome in the sense that the relationship with performer, electronics and video did not always appear to be connected in the performance of the piece.

In Case Study 2, our roles had begun to shift. One advantage of this shift was that discussion and early work sessions reflected a desire to let performer and composer into the domain of each other's practice. Interestingly, and perhaps unsurprisingly, the direction and timing of these conversations followed the development of the piece in relation to composer and performer roles – that is, early conversations had a lot to do with Carlos' compositional ideas and approach, and later discussions just prior to, and after the premiere were more concerned with the technical challenges faced by Nicole and Carlos in performing the work. A limitation faced in Case Study 2 was the incompatibility of the timelines of composer and performer as they are traditionally understood: often a work can be almost complete before a performer becomes involved in a practical sense. Additionally, planning, development

and rehearsal environments present different challenges to a live performance context which usually takes place later in the collaborative process, rather than at the beginning, for example.

Case Study 3 reflects a different approach again in that both performer and composer perspectives were included in the planning and discussion from the beginning, with systems design, compositional ideas and approaches to interpretation being given more consistent consideration. Advantages of this level of integration compared with the other two case studies are that both composer and performer felt more able to interact across the three key areas of the collaborative partnership. No one is excluded from a particular artistic relationship combination in this format. A limitation of this approach is that the amount of video and audio processing that can take place in real-time is determined by the system's computing capabilities [15]. This creates a situation in which the video and audio materials have to be designed within the system's constraints for the sake of a higher degree of interactivity. From the composer's perspective, this is not necessarily a drawback, given that composing interactive visual music is not only about combining sounds and images, but also about composing the relationships that will be established between them and the performer(s). However, reflecting on how to minimize the compromise between what a system can do in real-time and what the artist would want it to do is an important factor to consider in contexts like this.

10.2. Changes to practice

There were four notable changes to practice across the three case studies. Face to face interaction, joint decision making and regular and repeated collaborative work facilitated a number of changes to individual performer, composer and collaborative working approaches. Choices in the way in which computer systems were designed and employed also played a significant role in the evolution of a sense of joint practice.

10.2.1. Face to face interaction

Face to face interaction became an increasingly important factor in facilitating the development of new working processes between performer and composer. This has not only been the case for joint experiments, but also for determining the nature and structure of our independent work. Increased awareness of each other's individual skills and expertise brought about through our joint creative work has played a major part in shifting priorities reflected in the decision making and planning processes, allowing for the development of both more nuanced roles for composer and performer, and a reflective approach to systems design.

10.2.2. Joint decision making

Composer and performer jointly agreed what they would independently work on in Case Study 3. Resulting changes to practice have included more deliberate division of tasks and responsibilities, defining together pre-compositional material and determining parameters for performance. A fluid approach to systems design has greatly facilitated the conceptual shifts evident through these three cases of collaboration: the system has become an interface between composer and performer in which new roles, approaches and artistic outcomes have been defined and facilitated. In contrast, the approach taken in Case Study 1 was much less concerned with details of the role and tasks of the other with relation to the use of digital technology: it was designed by one artist for a specific purpose, and presented to the other without a great deal of prior discussion or consultation.

10.2.3. Regular and repeated collaborative work

The opportunity to undertake three different collaborative projects in a relatively short space of time (less than two years) is viewed by both participants as a significant factor in the development of their joint collaborative practice. In that sense, the case studies form a single example of an ongoing, evolving collaborative practice. The possibility of the collaborative 'next step' in the form of ongoing performance opportunities has been a critical factor – from both research and artistic perspectives – in providing an outlet and incentive in which to explore and implement changes to practice.

10.2.4. Changes to systems design/tailorability

Another observable feature of the evolving collaborative process is demonstrated in the systems design choices and/or use of digital technology in each case. In addition to discussions about the artistic possibilities and uses of different programs, an important consideration in the development of the system for Case Study 3 was the style of interaction between composer and performer that this system could afford. Notably different in this approach, as compared with case studies 1 and 2 was the objective to create a system that would facilitate jointly agreed artistic and collaborative objectives. This is in contrast to the idea of composer and performer supplying complementary, but separate components of the collaboration. In this sense, digital technology has a dual function, and in a way that mirrors changes to perfomer/composer interactions, a more nuanced role. It plays both a critical artistic part, and also functions as a tool for achieving new collaborative objectives.

10.3. Reflection : individual reflection and joint discussion

Reflection upon a range of factors over the course of the collaboration was highly illuminating for both participants. Artistically, discussing and evaluating the strengths and weaknesses of each piece was an important factor in understanding quite different traditional roles and creative perspectives. Conducting a review of theories of systems design, creativity and collaboration for the purposes of this study provided us with ideas for the theoretical framework in which we could place our actions and decisions, or interrogate other understandings of collaboration.

In more general terms, reflection and discussion seemed to facilitate a blurring of boundaries between performer and composer roles as our conversations generated new levels of interest and ownership in a wider range of the creative tasks. As the collaboration unfolded, the consequences of these discussions and reflection is evident in the revised approaches to creative decision making, including the different approaches taken to systems design. Case Study 2 provides a good example of the composer increasing his frame of activity to music and visuals, whilst we see the performer increasing the scope of her concerns to include her relationship to the visual elements of the piece alongside her music making/interpretive role.

11. CONCLUSIONS

In this study we have aimed to document and describe key factors contributing to an evolving collaborative relationship between a performer and a composer. Three areas which most facilitated change in the collaborative contexts outlined were 1) challenging traditional roles, 2) changes to practice and 3) reflection (both separately and together).

As a contribution to understandings of collaboration beyond the scope of these three cases, both from the perspective as researchers drawing upon established theories of collaboration and our own professional experiences as artists, we suggest that our study is useful for:

> Highlighting ways in which the challenging or blurring of traditional roles can facilitate new insights and approaches to practice;
>
> Appreciating the capabilities of systems design as both an essential artistic tool and facilitator of new levels of interaction between performer and composer in the composition and performance of visual music;
>
> Recognising the value of collaborative work environments for artists as a place of ongoing development and learning.

To that end, discussing, reflecting upon and employing in practice a range of theoretical perspectives on collaboration may be highly useful for composers and performers. Within the visual music making framework, working with tailor-made computer technology in a collaborative environment offers great possibility as both creative tool and interface in new performer/composer relationships and interactions.

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